Claims

1. A phased array antenna system with controllable electrical tilt including an antenna (124) with multiple antenna elements (124U1 to 124L3), characterised in that the system (40) has:
   a) means (46) for providing two basis signals with variable relative delay therebetween,
   b) splitting means (106a, 106b) for dividing the basis signals into signal components,
   c) phase to power converting means (110 to 114) for converting the signal components into transformed components having powers which vary as the relative delay varies, and
   d) power to phase converting means (116 to 120) for converting the transformed components into antenna element drive signals having phases which vary from antenna element (e.g. 124U1) to antenna element (e.g.124U2) progressively across the antenna (124) when the antenna (124) is electrically tilted and which individually vary as the relative delay varies.

2. A system according to Claim 1 characterised in that the phase to power converting means is a plurality of hybrid radio frequency coupling devices ("hybrids") (110 to 114) arranged to provide sums and differences of pairs of signal components, each pair having signal components from both basis signals.

3. A system according to Claim 1 characterised in that the phase to power converting means is a plurality of 180 degree hybrids (110 to 114) arranged to provide sums and differences of pairs of signal components, each pair having signal components from both basis signals.

4. A system according to Claim 3 characterised in that each pair has signal components of equal magnitude, but each pair's component magnitude is not equal to that of another pair.

5. A system according to Claim 3 characterised in that the hybrids are first hybrids (110 to 114) and the power to phase converting means incorporates a plurality of second hybrids (116 to 120) arranged to generate antenna element drive signals.

6. A system according to Claim 5 characterised in that the splitting means is a first splitting means (106a, 106b) and the power to phase converting means (116 to 120) incorporates a second splitting means (142c to 142h) arranged to divide the sums and differences into components for input to the second hybrids (144_4 to 144_9).

7. A system according to Claim 6 characterised in that the first splitting means (106a, 106b) is arranged to divide each of the basis signals into three signal components.

8. A system according to Claim 6 characterised in that the second splitting means is a plurality of two-way splitters (142c to 142h).

9. A system according to Claim 1 characterised in that it is arranged such that all paths extending from basis signal provision to antenna elements contain the same numbers and types of components.

10. A method of controlling electrical tilt of a phased array antenna system (40) including an antenna (124) with multiple antenna elements (124U1 to 124L3), characterised in that the method incorporates the steps of:
    a) providing two basis signals with variable relative delay therebetween,
    b) splitting the basis signals into signal components,
    c) converting the signal components into transformed components having powers which vary as the relative delay varies, and
    d) converting the transformed components into antenna element drive signals having phases which vary from antenna element (e.g. 124U1) to antenna element (e.g. 124U2) progressively across the antenna (124) when the antenna (124) is electrically tilted and which individually vary as the relative delay varies.

11. A method according to Claim 10 characterised in that step c) is implemented using a plurality of hybrids (110 to 114) arranged to provide sums and differences of pairs of signal components, each pair having signal components from both basis signals.

12. A method according to Claim 10 characterised in that step c) is implemented using a plurality of 180 degree hybrids (110 to 114) arranged to provide sums and

differences of pairs of signal components, each pair having signal components from both basis signals.

13. A method according to Claim 12 characterised in that each pair has signal components of equal magnitude, but each pair's component magnitude is not equal to that of another pair.

14. A method according to Claim 12 characterised in that the hybrids are first hybrids and step d) is implemented using a plurality of second hybrids (116 to 120) arranged to generate the antenna element drive signals.

15. A method according to Claim 14 characterised in that splitting in step b) is a first splitting and a second splitting is implemented in step d) to divide the sums and differences into components for input to the second hybrids (116 to 120).

16. A method according to Claim 15 characterised in that the first splitting divides each of the basis signals into three signal components.

17. A method according to Claim 15 characterised in that the second splitting is a plurality of two-way splits.

18. A method according to Claim 10 characterised in that all paths extending from basis signal provision to antenna elements (124U1 to 124L3) contain the same numbers and types of components.